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Evaluation of orthopaedic fast-track surgery from 2009 to 2013 in an Italian hospital

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Introduction

Each year millions of patients are treated for joint pain with total joint arthroplasty, and the numbers are expected to rise [1]. Total knee arthroplasty (TKA) has an integral role in the treatment of severe knee joint diseases including osteoarthritis and rheumatoid arthritis and long-term results for pain relief and functional improvement have been excellent [2] [3].

In the USA, demand for TKA has risen steadily over the past decade. By 2030, TKA demand is expected to increase by 673% equivalent to 3.48 million procedures [4].

The average length of stay (LOS) varies from 6 to 12 days in the United Kingdom, Germany and Denmark [5]. Everybody is oriented to reduce the hospitalization period.

In the last ten years we have developed many perioperative protocols dedicated to improve the peri- and postoperative patient conditions, in order to obtain a quick discharge and a fast functional rehabilitation minimizing any complications.

The Fast-Track method was defined by a Danish surgeon Henrik Kehlet at the end of the 90's. This method includes: epidural or regional anesthesia, minimal invasive surgery, optimal pain control, aggressive post-operative rehabilitation, early deambulation and oral nutrition [6].

A 2010 Danish study indicates that the application of the Fast-Track method resulted in a significant decrease in the needed number of hospital beds with similar or better outcome for the patients [7].

The aim of this study was to evaluate whether the application of the Fast-Track method has reduced the LOS during a period of 5 years, while taking care of the patients outcome and the readmission rate in our Department.

Materials and Methods

This is a retrospective study. All the patients gave their written consent to participate at this study. All data were obtained through the collection of the patients medical records and from our surgical and radiological digital databases. The inclusion criteria were first knee arthroplasty procedure and patient consent. We selected 100 patients, from April 2008 to September 2009 (group A) without the application of Fast-track protocol and they were compared to 100 patients, from January 2013 to December 2013 (group B) with the application of the new method. All the patient were operated in our Department (Orthopaedic and Traumatology I Department, University of Pisa, Italy) by 2 senior orthopaedic surgeon (M.L. and E.B.). For each patient the following factors were examined: age, gender, body mass index (BMI in kg/m2), diagnosis (osteoarthritis, rheumatoid arthritis, or others), co-morbid conditions (osteoporosis, diabetes mellitus, hypertension, chronic obstructive pulmonary disease [COPD], history of cerebrovascular or cardiovascular disease etc), ASA score, pre and postoperative hemoglobin levels, blood transfusions number, post-operative analgesia, physiotherapeutic protocol; for the surgical details we examined any complication occurred during surgery, the standard or minimal invasive approach, the anesthesiological procedures and the tourniquet time.

Each parameter was evaluated in order to identify a correlation with the LOS. All patients were admitted the day before the surgery date with the exception of those who were operated on Monday mornings and were admitted on Saturdays.

The physiotherapeutic protocol started on day I PO (post-operative) for group A; instead it began on day 0 for group B in which a passive mobilizer machine was immediately applied at the end of surgery. The patient was taught to seat in the chair on day 1 and day 3 for group A, (day 2 for group B), to deambulate with crutches and day 4 to take the stairs. Drain was removed on day 3 for group A and on day 1 for group B. The post-operative analgesia protocol for group A was the combination of morphine and ketorolac in an elastomeric pump for 48 hours with 1g paracetamol

i.v. as rescue dose; for group B besides the elastomeric pump and the rescue dose a perineural catheter (with the continuous block of the femoral nerve) was used for 48 hours. A spinal anesthesia was performed in all the cases with the exception of those it was contraindicated.

In group A a standard approach was used, resulting in larger disruption of quadriceps, eversion of the patella, dislocation of tibio-femoral joint and interruption of suprapatellar pouch. In group B a minimal invasive surgery approach was used; this approach is not a smaller skin incision, is comprised of a continuum of standard technique with many evolutionary features. The most important of these features are: quadriceps-sparing approach with less soft tissue dissection, lack of patellar eversion, and no tibio-femoral joint dislocation. In both group the same antithromboembolic prophylaxis was used.

All the patients were clinically and radiologically followed for at least 1 year with the same protocol (1,2,3,6,12 months) and all post-operative complications were recorded.

Results

In group A the average length of hospitalization was 9.25 days, among the all parameters analyzed, the following parameters seem to be predictive of the length of stay in hospital p(<=0,05): ASA score> = 3 (1.5 days), BMI> = 30 (2.3 days), need for blood transfusion >= 2 (+3.26 Days), age >= 75 (+2.12 days).

	Number of patients	Length of stay	p-value
ASA score			
<3	56	8.589285714	0.040342
>=3	44	10.09090909	
BMI			
<30	36	10.09090909	0
>=30	27	11.07407407	
Age			
<75	66	8.53030303	0.005386
>=75	34	10.64705882	
Blood transfusion			
<2	68	8.205882353	0.000014
>=2	32	11.46875	

Table 1. Parameters affecting LOS in group A patients with non-Fast-track protocols.

In group B the average length of stay was 7.17 days with no substantial differences between males and females. The age and BMI do not seem to affect the length of hospitalization, but these data are not statistically significant.

The increase of ASA score leads to a minimal difference in the length of stay. However, this data is not statistically significant, too. Indeed, the parameter that seems to be, one more time, predictive of LOS is the need for blood transfusion (BT) with 1 more day of hospitalization in patients who need of 2 or more of BT. This result is statistically significant.

Discussion

After the implementation of our fast-track procedures for primary knee replacement surgery, the mean LOS was reduced from 9,25 to 7,17 days.

We have found that LOS was associated with certain patient characteristics. Co-morbidities resulted in increased LOS. The preoperative use of walking aids was associated with increased LOS. One possible explanation is the differences in muscular strength and gait-pattern between patients with and without walking aids. The patients living alone stayed longer.

In both groups the blood transfusion was the most important predictor of discharge around the fourth day of admission, as the patients receiving blood had a 3-times increased likelihood of staying more than 4 days. We believe that these data can be used to predict which patients are expected to stay less than 4 days, and can thus facilitate the planning of patient flow. Increased ASA score was associated with longer LOS, as could be expected. This reflects the association with co-morbidities.

	Number of patients	Length of stay	p-value
Age			
<75	55	7.127272727	0.81138
>=75	45	7.222222222	
BMI			
<30	32	7.15625	0.815216
>=30	25	7.04	
Blood transfusion			
<2	68	6.9117647	0.05
>=2	32	7.71875	
ASA score			
<3	71	7	0.177032
>=3	29	7.586206897	

Table 2. Parameters affecting LOS in group B patients with Fast-track protocols.

In Group A BMI>=30 and age>=75 lead to an increase of LOS while in Group B there were no differences in LOS between older and younger patients and between patients with a BMI<30 or >=30. We suggest that these results could be taken as an achievement of our protocol. The homogeneity of LOS in the second group may suggest the “fast track surgery” is a good approach.

Current trends in total joint replacement have focused on less-invasive surgical approaches with the intent of providing quicker rehabilitation and shorter hospital stay. The early mobilization is important for the rehabilitation and for the reduction of complications, but the pain, the nausea, and dizziness which are connected to the post-operative analgesia protocols are the most important factors of the rehabilitation delay.

The use of epidural analgesia may delay the beginning of anticoagulant thromboprophylaxis due to the potential risk of epidural hematoma. Thus, a synthesis of the evidence is necessary to determine whether or not alternative analgesic modalities are worse, equivalent, or better than epidural analgesia. In contrast to epidural analgesia, continuous PNB (peripheral nerve blockade) techniques do appear to provide pain relief superior to systemic opioid analgesia, with a lower incidence of side-effects. Using the PNB technique on the contralateral leg of the patient had no effect.

Conclusion

In short, significant progress within the concept of fast-track surgery has been achieved to document a combined effort of preoperative optimization and information, “stress-reduced” surgery, efficient post-operative pain treatment, adjustment of perioperative care principles to existing evidence, and nursing care focusing on early mobilization and oral nutrition to enhance recovery, decrease morbidity, and hospital stay [8]. This requires obviously a multidisciplinary approach. Furthermore, early hospital discharge from an acute-care hospital, when appropriate, may benefit patients by reducing the risk of nosocomial infections and other iatrogenic complications.

The application of a fast-track protocol reduces the LOS in our Department without any significant increase of readmission rate.

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